



**Terry Tamminen**  
*Secretary for  
Environmental  
Protection*

# California Regional Water Quality Control Board

## Central Valley Region

**Robert Schneider, Chair**

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**Arnold  
Schwarzenegger**  
*Governor*

**TO:** Dr. Gerald Bowes  
State Water Resources Control Board  
Division of Water Quality

**FROM:** Kenneth D. Landau  
Assistant Executive Officer

**DATE:** 10 December 2004

**SIGNATURE:** \_\_\_\_\_

**SUBJECT:** PEER REVIEW OF PROPOSED BASIN PLAN AMENDMENT FOR THE CONTROL OF DIAZINON AND CHLORPYRIFOS DISCHARGES INTO THE LOWER SAN JOAQUIN RIVER

Central Valley Regional Board staff is preparing a Basin Plan Amendment for the Control of Diazinon and Chlorpyrifos Discharges into the Lower San Joaquin River. A draft Basin Plan Amendment and staff report should be available for peer review by approximately 22 December 2004. Attached is a summary of the proposed action, a description of the scientific issues to be reviewed in the proposed Basin Plan Amendment, and disclosure of external personnel involved in guiding the development of the documents to be peer reviewed. We anticipate taking this item to the Regional Board for formal consideration at the June 2005 Board Meeting.

I request you initiate at this time the selection of peer reviewers for this project. The peer reviewers should have experience with Total Maximum Daily Load technical issues; pollutant fate and transport in an aqueous environment; and assessment of risk or criteria development for aquatic life. I further request that the review be completed within 30 days after the proposed Amendment and supporting documents are sent to the peer reviewers. Please contact Diane Beaulaurier at (916) 464-4637 ([dbeaulaurier@waterboards.ca.gov](mailto:dbeaulaurier@waterboards.ca.gov)) or Joe Karkoski at (916) 464-4668 ([jkarkoski@waterboards.ca.gov](mailto:jkarkoski@waterboards.ca.gov)) if you have any questions or require additional information.

Attachments: (1) Summary of Proposed Action  
(2) Scientific Issues to be Peer Reviewed  
(3) Disclosure and Documents for Review

cc: Joe Karkoski, CVRWQCB  
Diane Beaulaurier, CVRWQCB

**California Environmental Protection Agency**



**Summary of Proposed Action**

The Regional Board has determined that its narrative water quality objectives are not being attained in the Lower San Joaquin River due to elevated levels of diazinon and chlorpyrifos, which exhibit additive toxicity. Based on this determination, the Regional Board and State Water Resources Control Board have placed the Lower San Joaquin River on the Clean Water Act Section 303(d) list. Identification of a water body and pollutant on the 303(d) list triggers the obligation to develop a Total Maximum Daily Load (TMDL) for that water body and pollutant. The Regional Board plans to establish numeric water quality objectives for chlorpyrifos (both chronic and acute). Regional Board staff believes that further evaluation of diazinon effects on invertebrates and salmonids is needed prior to establishing diazinon water quality objectives. To meet its obligations to develop TMDLs, the proposed Basin Plan Amendment identifies diazinon water quality targets that are used to establish the TMDLs and address the joint toxicity of diazinon and chlorpyrifos.

The Porter-Cologne Water Quality Control Act (the State water quality law) requires that six factors be considered in the development of water quality objectives: 1) the past, present, and probable future beneficial uses of the water; 2) the environmental characteristics of the hydrographic unit; 3) water quality conditions that could be reasonably achieved; 4) economic considerations; 5) the need for developing housing; and 6) the need to develop and use recycled water. Adoption of water quality objectives requires the adoption of a program of implementation for achieving those objectives. The program of implementation must include a description of the nature of the actions to be taken to achieve the objectives; a time schedule for the actions to be taken; and a surveillance and monitoring program to determine compliance.

Elevated diazinon and chlorpyrifos concentrations in the water column have been observed in the Lower San Joaquin River both during the dormant spray season, December through February and the irrigation season, March through November. The proposed Basin Plan Amendment would address all seasons. The TMDL loading capacity and allocations are established so that the additive effects of diazinon and chlorpyrifos should not cause toxicity. A review of the literature indicates that alternative pest control practices and runoff control practices are available to reduce diazinon and chlorpyrifos loading and that water quality objectives in the Lower San Joaquin River could be reasonably achieved. If adopted, the proposed Basin Plan amendments would result in:

- 1) establishment of site-specific, numeric water quality objectives for chlorpyrifos in the Lower San Joaquin River and identification of diazinon water quality targets;
- 2) establishment of a diazinon and chlorpyrifos Total Maximum Daily Loads (TMDLs) and associated allocations;
- 3) establishment of a program of implementation for diazinon and chlorpyrifos designed to meet the TMDLs (including the targets) and applicable water quality objectives; and
- 4) establishment of a surveillance and monitoring program to evaluate compliance with the water quality objectives and TMDL load allocations.

**Scientific Issues for Peer Review**

The statutory mandate for external scientific peer review (Health and Safety Code Section 57004) states that the reviewer's responsibility is to determine whether the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices.

We request that you make this determination for each of the following issues that constitute the scientific basis of the proposed regulatory action. An explanatory statement is provided for each issue to focus the review.

**1. Use of the California Department of Fish and Game's chlorpyrifos water quality criteria document as the basis for site-specific water quality objectives.**

The recommended chlorpyrifos water quality objectives are based on the California Department of Fish and Game's (CDFG) chlorpyrifos water quality criteria document (Siepmann and Finlayson, 2000). CDFG generally followed the United States Environmental Protection Agency's (USEPA) guidance on the derivation of criteria for the protection of aquatic life (USEPA, 1985). CDFG's acute criterion was recalculated to two significant figures to be consistent with the USEPA guidance. The frequency with which the criteria can be exceeded has been changed from the USEPA guidance recommendation of once every three years on the average to once every three year period to simplify evaluation of compliance. Alternatives to the CDFG criteria include USEPA criteria, criteria developed by Canada, and criteria developed by Australia and New Zealand.

**2. Use of a Toxic Unit formula for the loading capacity and allocations to account for the additive effects of diazinon and chlorpyrifos.**

The Regional Board's Basin Plan includes a formula for assessing the cumulative impact of pesticides in a water body. The formula sums the ratios of the concentration of each pesticide in the water body to the applicable criterion or objective for that pesticide<sup>1</sup>. A sum of greater than one would indicate that applicable narrative objectives are not met. The formula assumes that the pesticides exhibit additive toxicity. Studies show that this is the case for diazinon and chlorpyrifos, which have the same mode of action on target organisms. The toxic unit formula is applied to both the loading capacity and allocations (i.e. the sum of the ratio of the concentrations). Alternative approaches to the loading capacity calculation included using a load-based toxic unit formula (i.e. the sum of the ratio of the loads). Alternative approaches to the load allocations included basing watershed allocations on relative acreage of crops that use diazinon and chlorpyrifos, and pounds of pesticide use.

**3. Use of different diazinon water quality targets to account for invertebrate versus salmonid impacts.**

Available diazinon criteria include study results that have been called into question and do not include recent information on potential sub-lethal effects of diazinon on salmonids. Water quality targets are proposed until such time as more recent studies can be evaluated and new criteria developed. The water

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<sup>1</sup> The applicable criterion or objective will be the water quality target for diazinon and the water quality objective for chlorpyrifos.

quality targets are used to interpret existing narrative water quality objectives. Narrative objectives do not allow toxic substances in concentrations that produce detrimental physiological responses or pesticides to adversely affect beneficial uses. The proposed chlorpyrifos water quality objectives are primarily driven by toxicity test results for arthropods. CDFG has recalculated their diazinon criteria, without accounting for more recent studies. The recalculated CDFG diazinon criteria is also driven by toxicity test results for arthropods and is used in conjunction with the proposed chlorpyrifos objectives in the toxic unit formula. Since potential impacts to salmonids may occur at levels below the CDFG diazinon criteria, a separate diazinon target specifically for salmonids is proposed.

#### **4. Overarching questions**

Reviewers are not limited to addressing only the specific issues presented above, and are asked to contemplate the following “big picture” questions.

- (a) Are there any additional scientific issues that are part of the scientific basis of the proposed rule that are not described above? If so, please comment with respect to the statutory language given above (i.e. Health and Safety Code Section 57004).
- (b) Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices?

**Disclosure of External Personnel Involved in Guiding the Development of the Documents to be Peer Reviewed**

No personnel external to the Regional Board were involved in the development or in guiding the development of the documents to be peer reviewed.

**Primary Document to be Reviewed**

Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River; Peer Review Draft Staff Report

**Additional Materials to be Provided**

- Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses, U.S. EPA, 1985.
- Water quality criteria for diazinon and chlorpyrifos, Siepmann and Finlayson. 2000.
- Water quality for diazinon, Finlayson. 2004.
- Diazinon disrupts antipredator and homing behaviors in chinook salmon (*Oncorhynchus tshawytscha*). Scholz, et al. Can. J. Fish. Aquat. Sci. 57:1911-1918 (2000).